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(54) **A rotary die cutting apparatus**

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Description

THIS INVENTION concerns rotary die cutting apparatus according to the preamble of claim 1. In operation, flat board is transported tangentially past the cylinder so that the knives perform a predetermined cut on the board.

Conventionally, the forme which is usually made from timber and preformed, is attached to the surface of the cylinder by screws which must be aligned with threaded apertures in the cylinder. When it is required to change or replace the forme a lengthy procedure is required to remove and replace a considerable number of screws.

In an alternative arrangement the forme may be mechanically clamped onto the cylinder wall using cumbersome clamping arrangements so that the cylinder requires careful balancing.

An object of the present invention is to provide, in rotary die cutting apparatus, a means for removably mounting a forme such that it may be easily and rapidly removed from the cylinder for replacement.

According to the present invention there is provided rotary die cutting apparatus comprising a driven rotary cylinder on the outer surface of which is mounted at least one radially removable forme extending around less than the full circumference of the cylinder with knives projecting radially from the forme; characterised in that the or each forme is retained in contact with the outer surface of the cylinder by electric holding magnets of the type which may remain in an operative mode with the electric power turned off, such that the forme or formes cannot become detached in the event of a power failure. Preferred embodiments of the invention are defined in dependent claims 2 to 5.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a partial transverse section of a rotary die cutting cylinder and forme, made in accordance with the invention;

Fig. 2 is a side elevation thereof with parts cut away for the purpose of illustration;

Referring now to the drawings, in rotary die cutting apparatus there is provided a rotatable cylinder 10 which is driven in rotation by conventional means (not shown) and on which is circumferentially mounted a wooden forme 11 constituted, in this example, by a pair of separately mounted substantially semi-circular sections which are in edge-to-edge abutting relationship at one side as illustrated at 12 with a gap 13 at the other side. Each forme section carries, in accordance with a predetermined cutting pattern, an arrangement of radially projecting knives 14.

Extending longitudinally of each forme section on the inner surface thereof are a plurality of spaced steel bars 15, 16 and 17. These may be attached to the forme by countersunk machine screws as illustrated at 18.

The steel bars 15, 16 and 17 are so positioned as to be received within complementary longitudinal grooves 19 in the outer surface of the cylinder 10. Coinciding with the grooves 19 at longitudinally spaced positions along the cylinder are a plurality of permanent electric holding magnets 20 retained within housings 21 and arranged to be energised by power means (not shown) external to the cylinder. Such magnets are energised to change their polarity, but may be in an operative or inoperative mode with the power turned off.

The steel bar 17 has one edge chamfered as illustrated at 17a such that the forme may be mounted on the cylinder by initially locating bars 15 and 16 in their respective grooves 19, and, by virtue of the flexibility of the forme 11 and the assistance of the chamfered edge 17a, finally locating bar 17 in its respective groove.

In operation of the apparatus, the magnets 20 retain the steel bars 15, 16 and 17 in their respective slots 19 to overcome the centrifugal force which would otherwise tend to free the formes from the cylinder 10. Once the magnets are de-energised the forme may be readily removed by initially removing bars 17 from their slots and subsequently the bars 16 and 15.

The forme may consist of one or several sections according to the required length of cut and may be removed from its associated cylinder in a matter of seconds and replaced so that machine down-time is considerably reduced when compared with the conventional techniques of bolting or clamping formes in place.

Claims

1. Rotary die cutting apparatus comprising a driven rotary cylinder (10) on the outer surface of which is mounted at least one radially removable forme (11) extending around less than the full circumference of the cylinder (10) with knives (14) projecting radially from the forme (11); characterised in that the or each forme (11) is retained in contact with the outer surface of the cylinder (10) by electric holding magnets (20) of the type which may remain in an operative mode with the electric power turned off, such that the forme or formes (11) cannot become detached in the event of a power failure.
2. Rotary die cutting apparatus according to Claim 1, including a plurality of inwardly facing

spaced steel bars (15, 16, 17) mounted on the inner surface of the or each forme (11) to project radially inwardly therefrom and extending longitudinally of the forme (11) parallel to the axis of rotation of the cylinder (10), complementary longitudinal grooves (19) in the outer surface of the cylinder (10), and longitudinally spaced electric holding magnets (20) located in the base of each said longitudinal groove (19), and including means to energise said magnets (20) thus to retain or release the steel bars (15, 16, 17) in or from the longitudinal grooves (19).

3. Rotary die cutting apparatus according to Claim 2, wherein at least one of said steel bars (17) has at least one chambered longitudinal edge (17A) to enable engagement and disengagement of said bar (17) with and from its associate groove (19).
4. Rotary die cutting apparatus according to any preceding claim, wherein said forme (11) is divided into a plurality of part-cylindrical forme sections according to the required length of cut to be performed by the knives (14).
5. Rotary die cutting apparatus according to Claim 2 or Claim 3, wherein the grooves (19) and magnets (20) are disposed in diametrically opposed pairs around the circumference at predetermined positions thus to accommodate part-cylindrical forme sections (11) according to the required length of cut to be performed by the knives (14).

Patentansprüche

1. Drehbare Stanzvorrichtung mit einem angetriebenen, drehbaren Zylinder (10), an dessen äußerer Oberfläche wenigstens eine radial entfernbare Form (11) befestigt ist, die sich um weniger als den vollen Umfang des Zylinders (10) erstreckt, wobei Messer (14) radial von der Form (11) vorstehen; dadurch gekennzeichnet, daß die oder jede Form (11) in Kontakt mit der äußeren Oberfläche des Zylinders (10) durch elektrische Haltemagnete (20) des Typs gehalten wird, welcher bei ausgeschalteter Stromversorgung in einer wirksamen Betriebsart bleiben kann, so daß die Form oder Formen (11) im Falle eines Stromausfalls nicht lose werden können.
2. Drehbare Stanzvorrichtung nach Anspruch 1, mit mehreren einwärts gerichteten, beabstandeten Stahlstäben (15, 16, 17), welche an der inneren Oberfläche der oder jeder Form (11)

so befestigt sind, daß sie radial nach innen davon wegstehen und sich längs der Form (11) parallel zur Drehachse des Zylinders (10) erstrecken, komplementären Längsnuten (19) in der äußeren Oberfläche des Zylinders (10), und in Längsrichtung beabstandeten elektrischen Haltemagneten (20), welche am Grund jeder Längsnut (19) angeordnet sind, mit einer Einrichtung zum Erregen der Magnete (20), um so die Stahlstäbe (15, 16, 17) in den Längsnuten (19) zu halten oder sie davon zu lösen.

3. Drehbare Stanzvorrichtung nach Anspruch 2, wobei wenigstens einer der Stahlstäbe (17) wenigstens einen angefasten Längsrand (17A) hat, um das Einfassen des Stabes (17) in seine und das Lösen aus seiner zugeordneten Nut (19) zu gestatten.
4. Drehbare Stanzvorrichtung nach einem der vorhergehenden Ansprüche, wobei die Form (11) in mehrere teilzylindrische Formabschnitte entsprechend der erforderlichen Länge des durch die Messer (14) auszuführenden Schnittes geteilt ist.
5. Drehbare Stanzvorrichtung nach Anspruch 2 oder Anspruch 3, wobei die Nuten (19) und die Magnete (20) in diametral entgegengesetzten Paaren um den Umfang in vorbestimmten Positionen angeordnet sind, um so teilzylindrische Formabschnitte (11) entsprechend der erforderlichen Länge des durch die Messer (14) auszuführenden Schnittes aufzunehmen.

Revendications

1. Appareil de découpage à l'emporte-pièce rotatif comprenant un cylindre rotatif commandé (10) sur la surface extérieure duquel est monté au moins une forme (11), qui peut se retirer radialement et qui ne s'étend pas sur toute la circonférence du cylindre (10), avec des couteaux (14) s'étendant radialement à partir de la forme (11); caractérisé en ce que la forme ou chacune des formes (11) est maintenue en contact avec la surface extérieure du cylindre (10) par des électroaimants de maintien (20) du type qui peuvent rester en fonctionnement lorsque l'alimentation électrique est coupée, de telle sorte que la forme ou les formes (11) ne peut pas se détacher en cas de problème d'alimentation.
2. Appareil de découpage à l'emporte-pièce rotatif selon la revendication 1, comprenant une pluralité de barres d'acier (15, 16, 17) espacées, regardant vers l'intérieur et montées sur

la surface intérieure de la forme ou de chacune des formes (11) pour s'étendre radialement vers l'intérieur à partir de celle(s)-ci et s'étendant dans le sens longitudinal de la forme (11) parallèlement à l'axe de rotation du cylindre (10), des gorges longitudinales complémentaires (19) dans la surface extérieure du cylindre (10), et des électroaimants de maintien (20) espacés longitudinalement et placés dans la base de chacune des gorges longitudinales (19), et comprenant un moyen d'excitation desdits aimants (20) afin de maintenir de cette façon les barres d'acier (15, 16, 17) dans les gorges longitudinales (19) ou les libérer de celles-ci.

3. Appareil de découpage à l'emporte-pièce rotatif selon la revendication 2, où au moins une desdites barres d'acier (17) comporte au moins un bord longitudinal chanfreiné (17A) pour permettre l'engagement desdites barres (17) avec sa gorge associée (19) et leur désengagement de celle-ci.
4. Appareil de découpage à l'emporte-pièce rotatif selon l'une quelconque des revendications précédentes, où ladite forme (11) est divisée en une pluralité de sections de forme partiellement cylindriques en fonction de la longueur requise de découpage qui doit être réalisée par les couteaux (14).
5. Appareil de découpage à l'emporte-pièce rotatif selon la revendication 2 ou la revendication 3, où les gorges (19) et les aimants (20) sont placés de manière diamétralement opposée deux à deux sur la circonférence à des emplacements prédéterminés pour loger ainsi les sections de forme partiellement cylindriques (11) en fonction de la longueur requise de découpage qui doit être réalisée par les couteaux (14).

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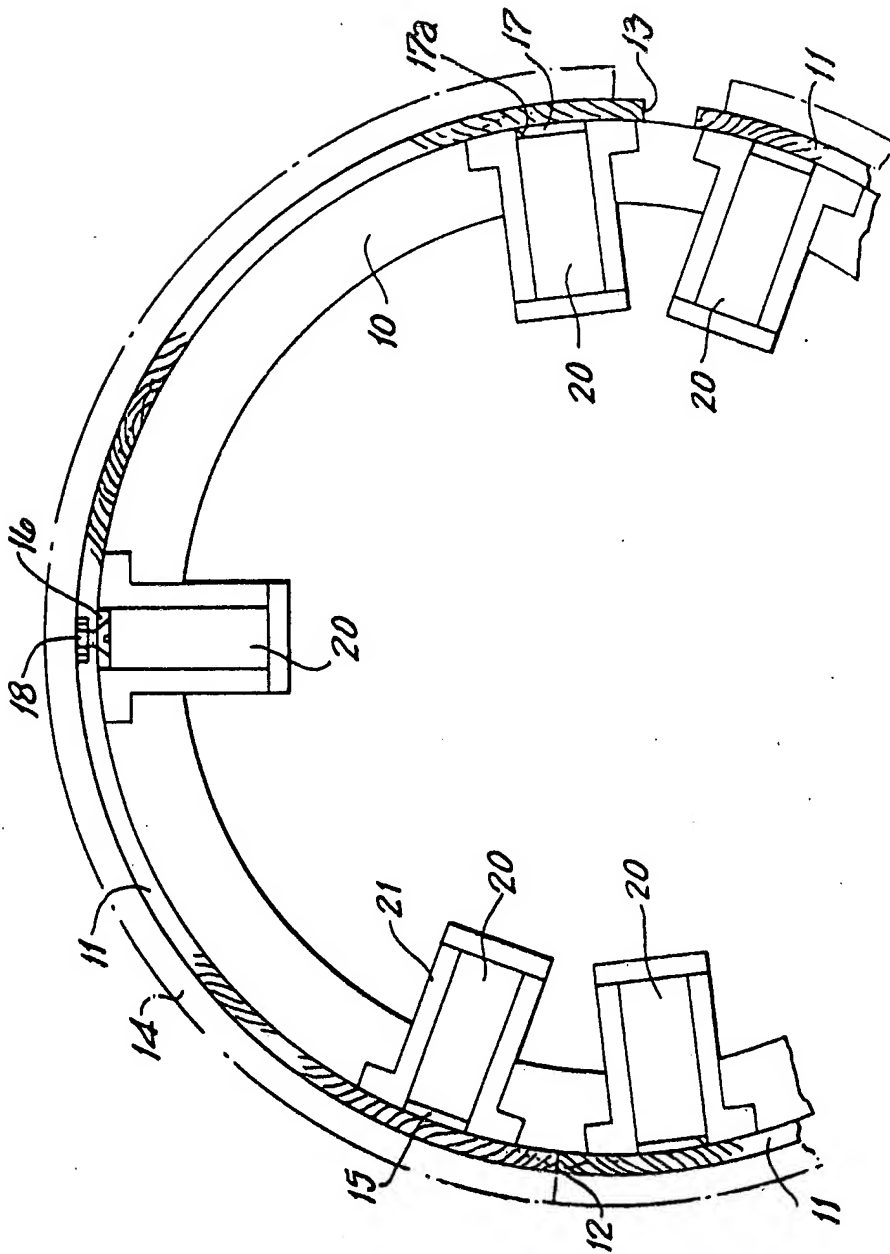


FIG.1

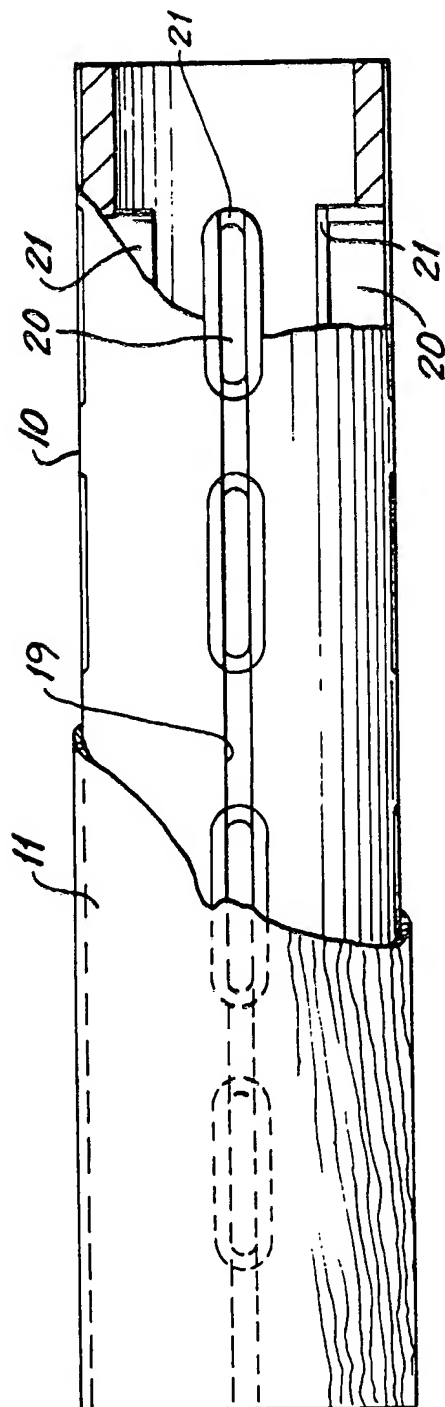


FIG. 2